Multi-Carrier Indoor Booster
BMB0900-180-SG01
User Manual

BRAVO TECH INC
Add.: 6185 Phyllis Drive Unit D, Cypress, CA 90630
Phone: 1-714-230-8333
Website: www.bravotechinc.com

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1 System Overview

This chapter introduces the function, character, elements and structure of multi-carrier booster BMB0900.

1.1 General description

The multi-carrier booster BMB0900 amplifies uplink and downlink signal, extends the coverage of GSM networks and improves uplink sensitivity, so as to improve the connect efficiency of network.

A booster BMB0900 is composed of two functional components: indoor unit (Booster) and outdoor units (TMA- Tower Mounted Amplifier). The indoor unit amplifies downlink signal,. Meanwhile it has functions of control and monitor as well as power supply. The outdoor unit amplifies uplink signal.

Table 1 The Composing of BMB0900

Model	Sort	Composing	Function
BMB0900	BTS Booster	Indoor unit - Booster	Amplify Downlink signal, control and monitor, power supply
		Outdoor unit - TMA	Amplify uplink signal

The booster (indoor unit) and TMA (outdoor unit) are shown as Figure 1 and 2 respectively.

Figure 1 Indoor Unit - Booster

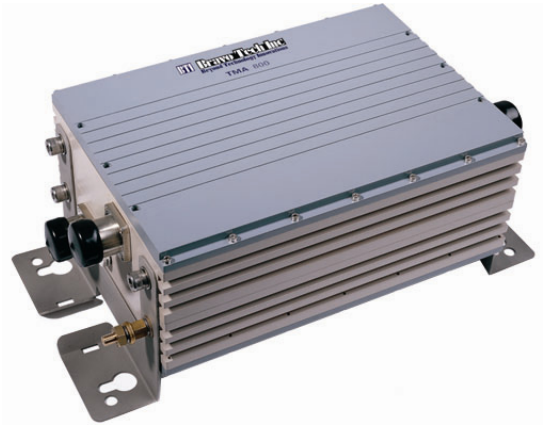


Figure 2 Outdoor Unit - TMA

1.2 System Block Diagram

The following figure shows the system block diagram of the multi-carrier booster BMB0900.

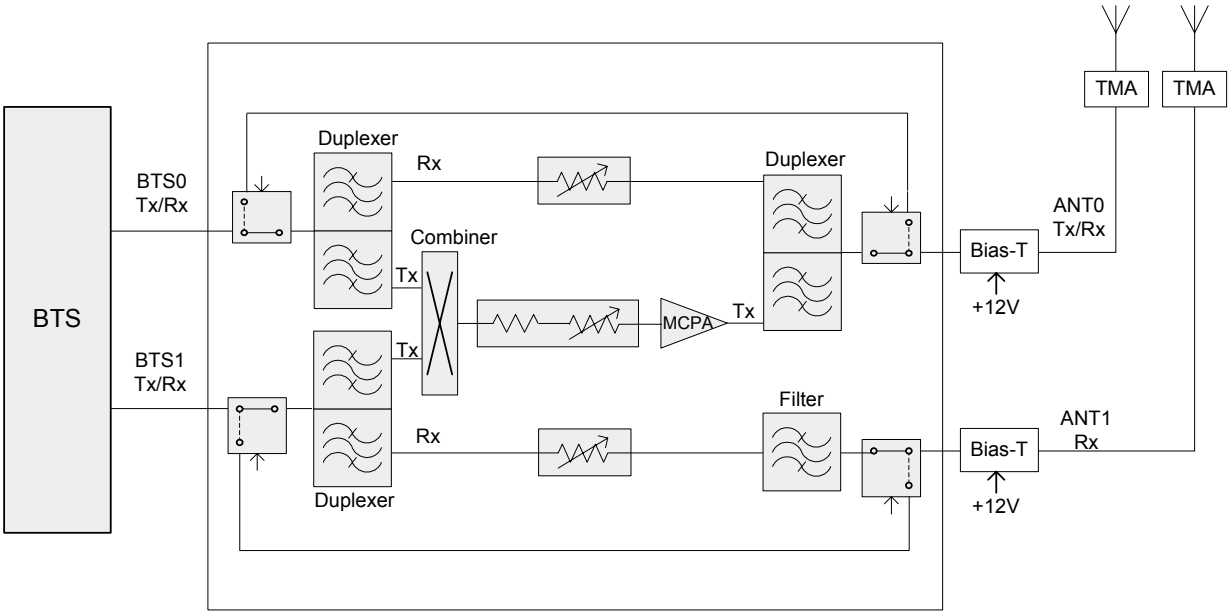


Figure 3 Configuration Of Indoor Booster

1.3 Function

Multi-carrier booster BMB0900 has the following functions:

- The indoor unit (booster) amplifies downlink signal up to 180W, so as to extend the coverage of BTS.
- The outdoor unit (TMA) amplifies uplink signal, reduces noise figure and improves uplink sensitivity.
- Auto by-pass function.
- Built-in input attenuator eliminate the need of changing BTS 'S output power, so the system won't be fault or be shut down because of BTS recover, taking over or frequency changing.
- Extensive system monitor and control (local and remote)

- Support system full diversity.

1.4 Application

The multi-carrier booster BMB0900 provides coverage for the following applications:

- Coastlines and large lakes.
- Districts far from city center, such as remote countryside.
- Long and narrow districts, such as highway, railroad, sea-route.
- Special districts, such as grassland and desert.
- Districts where macro-BTS is difficult to be built and coverage of micro-BTS or micro-cell is not enough, such as mountainous region, foothill, highland.
- Districts where the coverage of micro-BTS or micro-cell is not good, such as blind spots of micro-cell coverage.
- Large landscape districts.
- Large districts where wireless user is few.
- The edge of cities where the users need high quality wireless network.

1.5 System Configuration

The system configuration of a multi-carrier booster BMB0900 is shown in Figure 4.

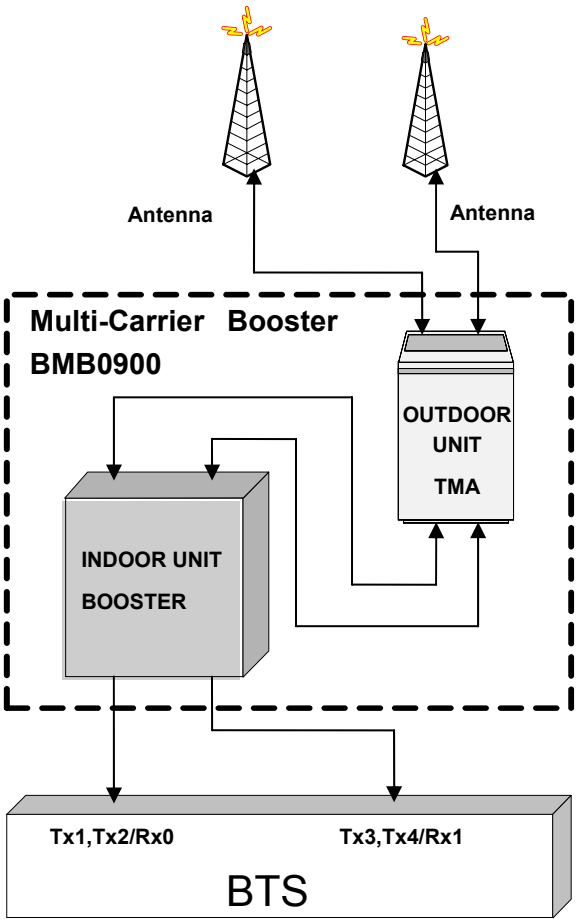


Figure 4 System Configuration

1.5.1 Indoor unit (booster)

The Indoor unit (booster) amplifies downlink signal up to 180W, so as to extend the coverage of BTS. The dimension of indoor unit (booster) is 800mm*330mm*600mm.

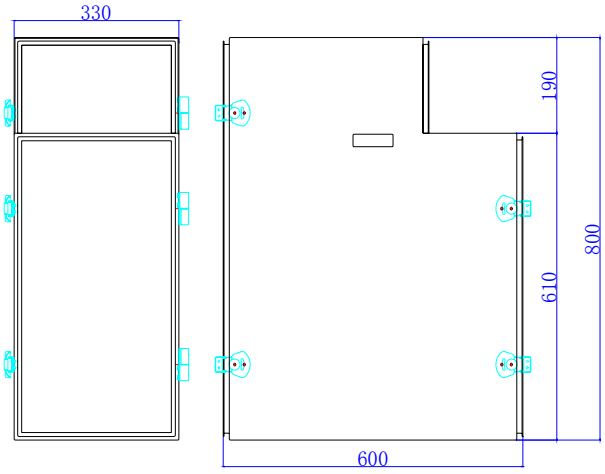


Figure 5 Indoor Unit

A booster consists of MCPA unit, RF conditioning unit (RFCU), control unit and power unit. MCPA unit amplifies the power of multi-carrier signal. 2 MCPAs can be configured according to user's requirements. RFCU consists of duplexes, which couples uplink and downlink signal. Control unit monitors the booster's working status and alarm information. By-pass function will be activated by control unit in case of system failure. Power unit consists of rectifier and breaker, supplies power for indoor and outdoor units.

The interface of the indoor unit (booster) is on the top of the cabinet, as shown in Figure 6. The specification of the interface is shown in Table 2.

Figure 6 Indoor Unit(Booster) Interface

Table 2 Indoor Unit (Booster) Interface Specification

Interface	Specification
POWER	Input power interface for 220V AC
BTS0	Connect to BTS main TX0/RX0 port
BTS1	Connect to BTS diversity TX1/RX1 port
ANT0	Connect to main antenna (TX0/RX0)
ANT1	Connect to diversity antenna (TX1/RX1)
TMA0 +12V	Connect to Bias-T DC port , DC +12V power supply for TMA0
TMA1 +12V	Connect to Bias-T DC port ,DC +12V power supply for TMA1
ALARM	ALARM output port

1.5.2 Outdoor unit (TMA)

The TMA amplifies the power of uplink signal, reduces noise figure and improves uplink sensitivity. A TMA's dimension is 290mm x 200mm x 85mm. Its weight is 8.5kg.

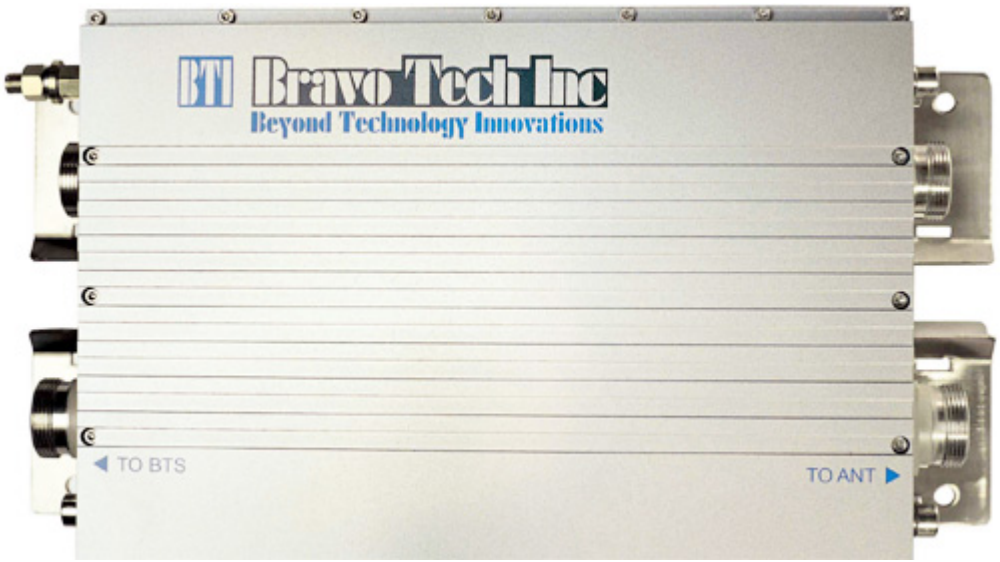


Figure 7 TMA

Table 3 TMA'S Interface Specification

Interface	Specification
To BTS	Connect to indoor unit booster
To ANT	Connect to antenna

2 System Installation

This chapter introduces the installation method of multi-carrier booster BMB0900.

Installation steps are as the following chart.

Table 4 Installation Flow

Step	Specification
1	Installation prepare
2	Install indoor unit
3	Install outdoor unit
4	Install and connect the feeder
5	Installations inspecting
6	System test

2.1 Installation overview

2.1.1 Requirements on installation site

1. **The wall for outdoor unit installation**

- The wall should be water-resistant, dry, non-caustic and without high-voltage power leaking.
- The outdoor unit should be mounted in the wall whose bearing capacity is more than 20kg.
- Concrete walls and brick walls are recommended, because those walls can fix expanded screws. Masonry walls or sandy-dust walls are not suitable.

2. **The mast for outdoor unit installation**

- The mast should be stable, dry, non-caustic and without high-voltage power leaking.
- The mast should be suitable for installing the U-bolts.

2.1.2 Requirements on anti-corrosion and shock-protection

To safeguard products and operators, the installing location must be kept away from caustic or poisonous fog and gas. The walls which can't meet the requirement on shock-resistant must be pined up or fixed.

2.1.3 Requirements on illumination, ventilation and fire protection

The installation site should have enough illumination for installation and maintenance need. Flammable and explosive material should not be near to the site. The portable fire extinguishers must be setup nearly for fire prevention.

2.1.4 Power requirements

Nominal voltage: 220V AC. Variety range: 180-264 V AC, 47-63 Hz Single Phase

The power consumption of a single MCPA booster is about 1300W, and the power consumption of a dual MCPA booster is about 2600W. Be cautious to the fuse capacity.

2.1.5 Requirements on lightning protecting and grounding

The cross section of grounding cable should be no smaller than 25mm^2. The grounding cable should be connected to the ground directly without any juncture. Keep the grounding cable as short as possible.

2.1.6 Installation preparation

The following technical files and tools will be used for a successful installation:

1.**Technical files**

- Contract, equipment scheme chart.
- Designing and construction drawing of installation site.
- Multi-Carrier indoor Booster BMB0900-180-SG01 User Manual

2.**Tools and equipments**

- A multimeter
- Cross point screwdrivers
- Slotted screwdrivers
- Wrenches
- A Drill
- A spectrum analyzer
- A signal generator
- A VSWR testing devices
- N connectors
- RF testing cables

2.2 Indoor unit（Booster） installation

2.2.1 Installation requirements

- Located beside BTS
- Convenient to maintain system
- Close to BTS
- In the same site with BTS

2.2.2 Installation steps

⚠ Attention:

Before installation, determine if the indoor unit should be installed inmovably or not. If it will be removed in the future, or it is not strictly required to be stable, an inmovable installation is not necessary.

Table 5 Installing Steps For Indoor Unit

Step	Operation
1	Drill 4 holes(Φ12) in the concrete ground, Whose depth is 55-60mm, as shown in Figure 8,
2	Install inflatable bolt, as shown in Figure 9.
3	Mount the booster on the floor.

The diameter of booster fixing holes is Φ12. The distance between holes is 390*380mm. The M10 bolt will be suggested to use for fixing the booster.

The following figures show the installation steps.

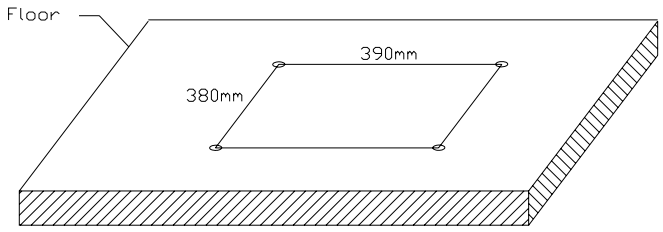


Figure 8 Distance Of Installing Holes

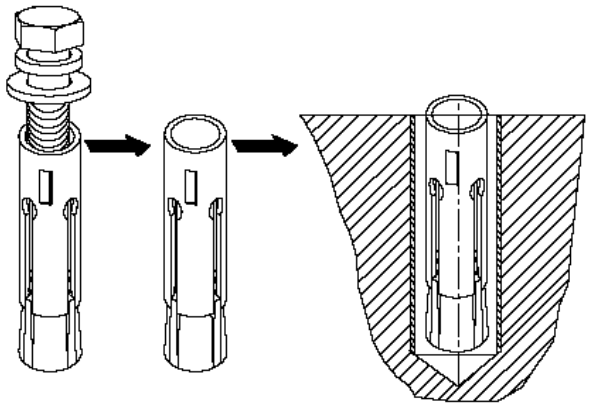


Figure 9 Installing Inflatable Bolt

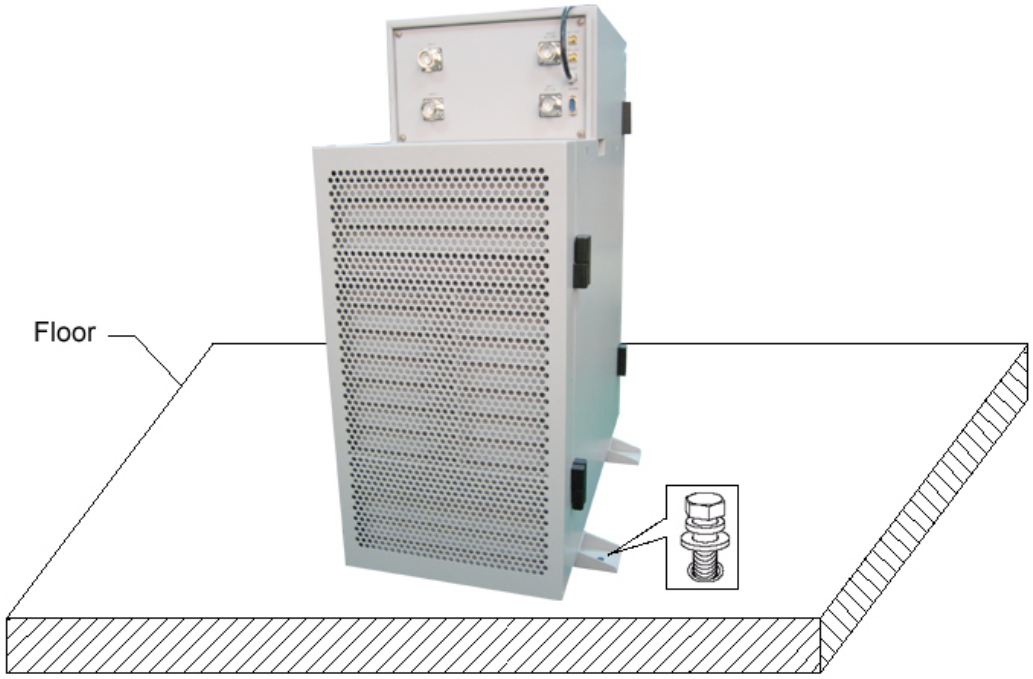


Figure 10 Installing Booster

2.3 Outdoor unit (TMA) installation

2.3.1 Installation requirements

- Located under the antenna
- Close to the antenna
- Sufficient space for installation

2.3.2 Installation

⚠ Danger:

The following high-altitude operation should be only performed by qualified personnel under well protection.

Table 6 Installing Steps For TMA

Step	Operation
1	Install the TMA bracket on the tower, as shown in Figure 11. Mount the bracket by using clamp A and clamp B.
2	Install the hexangular bolt in the clamp A.
3	Mount the TMA at the bracket.

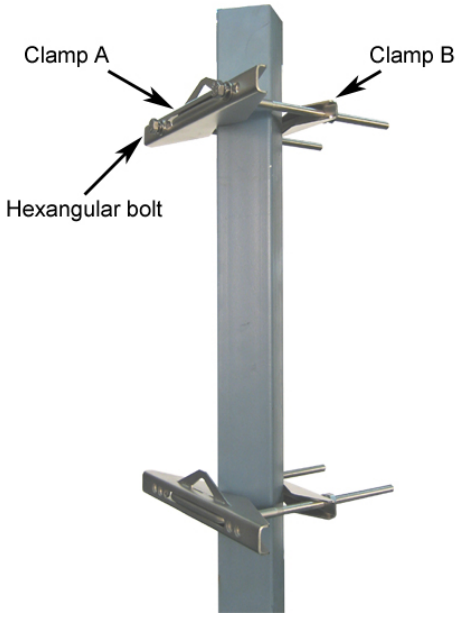


Figure 11 Bracket for TMA

TMA installation is shown as Figure 12

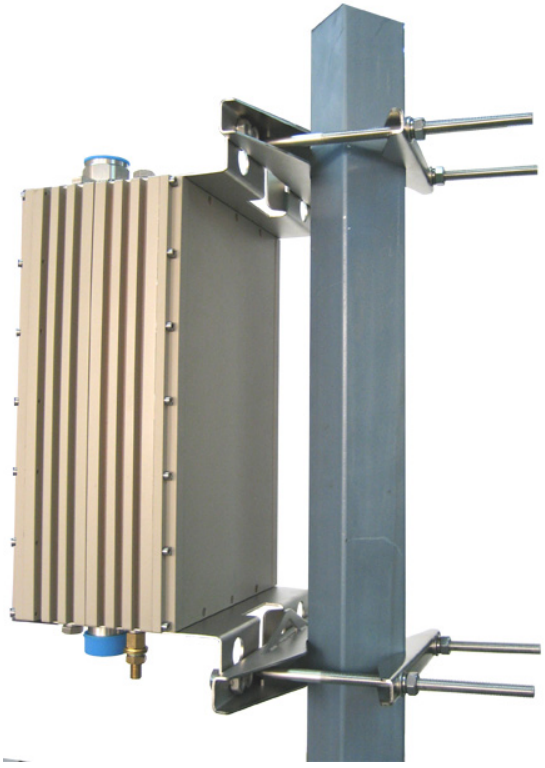


Figure 12 Installing of TMA

2.4 Cable installation

2.4.1 Installation of power cable and grounding cable of the indoor unit

1. **Installation requirements**

- Avoid crossover between signal cable and grounding cable/power cable.
- The power cable and grounding cable must be integrative, without connectors.
- Checking open circuit and short circuit before installing the power cable.

2.**Installation**

> ⚠Attention:
> All the power switchs must be switched off before cable installation. The cable outside of the cabinet must be covered with ripply bushing.

The installation of power cable and grounding cable is shown in Figure 13. The yellow terminal of power cable connects to power ground terminal. The ground terminal of booster is on the right down side of cabinet. The grounding cable should be copper cable, with section larger than 25mm^2 and resistance lower than 5Ω

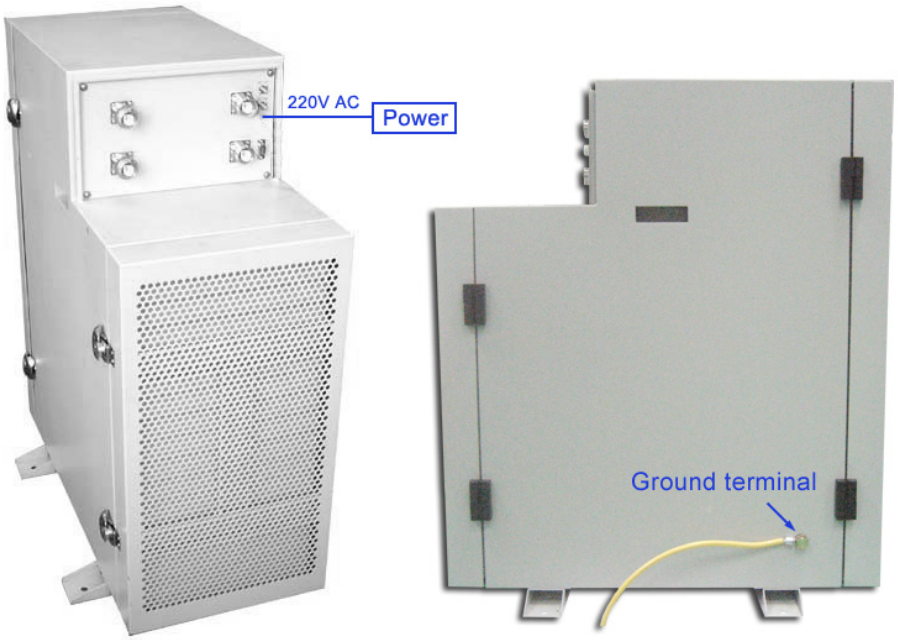


Figure 13 Installing Power Cable And Ground Cable

2.4.2 Installation and connection of feeder

1.**Installation requirements**

- Shut down the base station and transmitters.
- Mark the feeder with label after installation.

2.**Installation**

The cable installation and connection is shown in Figure 14

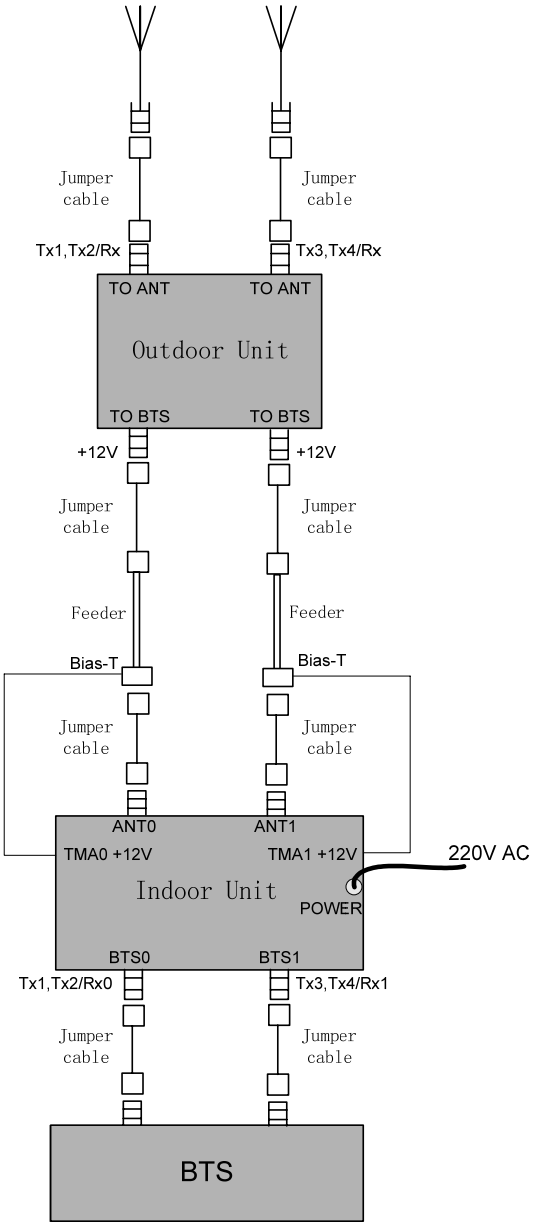


Figure 14 Installing Cable

⚠ Attention:

Bias-T must be installed between the base station lightning arrester and the feeder, otherwise the Bias-T's output voltage DC +12V will be short circuited.

2.5 Installation inspection

2.5.1 Device inspection

Table 7 Device Inspection

Item	Description
1	Stable and normal
2	Fixed horizontally
3	Screws and nuts must be screwed tightly, without missing flat washers and spring washers. Spring washers must be on the top of flat washers
4	No break off in each part and cable.
5	Clean, no smear or dust.
6	Connections between metallic configurations must be reliable, to assure the reliable electric connectivity.

2.5.2 Cable inspection

Table 8 Cable Inspection

Item	Description
1	The connection of the cable is stable, no loosed or damaged
2	The cable sheathing shouldn't be damaged.
3	Grounding cable is reliable
4	Cables are connected well, without crossover between cables. Keep the cable loose if it needs curve, and the cables should be bundled together of the same direction.
5	Don't tense the cable in curving place. The curving radius of the cable shouldn't less than twenty times of the cable's diameter.

2.6 System test

Test the system after the device was installed and inspected.

Test steps for GSM multi-carriers booster:

- Startup testing: uplink and downlink gain setting, view chapter 3.2.5 for details.
- VSWR testing
- Effect testing: DT/CQT testing
- Region optimize: base on the OMC-R statistic data, adjusting the base station's physical parameter, regional parameter and switch parameter. So that the system can work to the best effect.

Test flowing chart is as Figure 15:

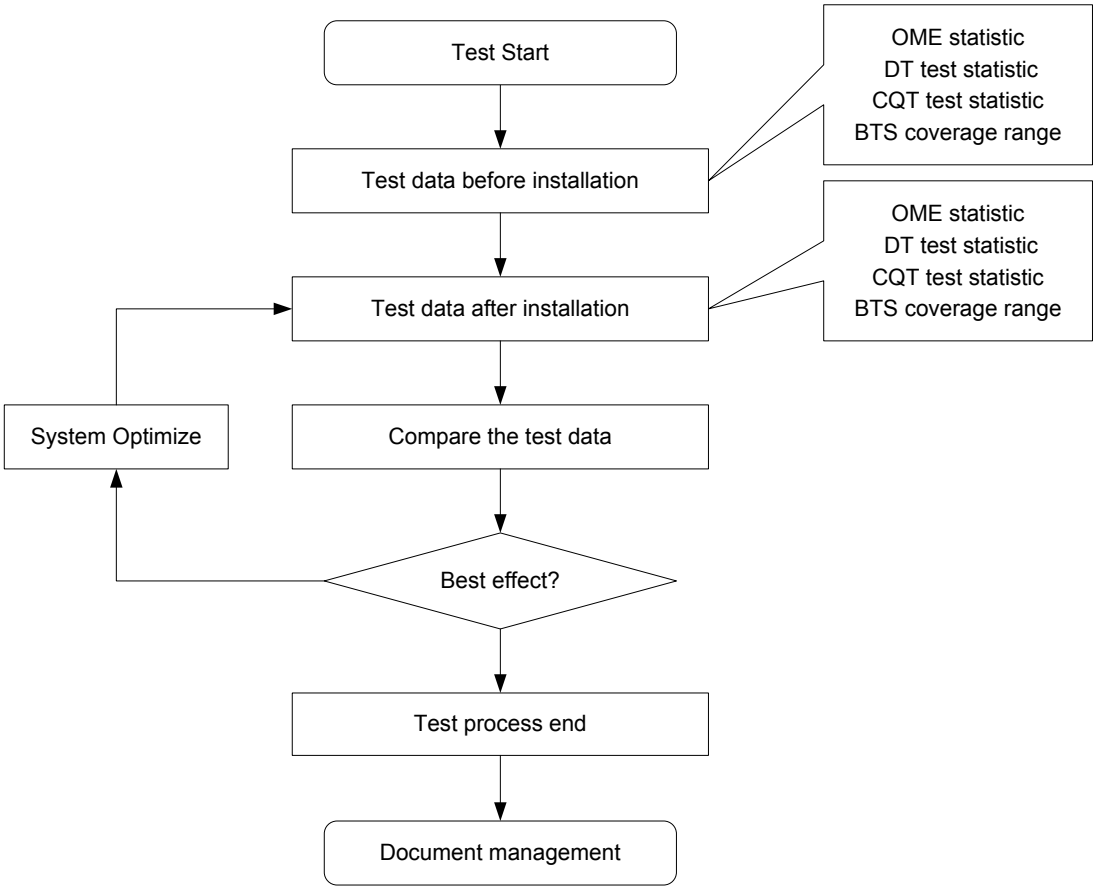


Figure 15 System Testing Flow

3 Maintenances and Managements

A multi-carrier booster can be managed via LCD on the cabinet. This chapter describes the operation and maintenance of the system.

3.1 System maintenance

3.1.1 Routine maintenance

The booster provides the following protection functions: overpower protection, over-temp protection, loop fail protection, reverse power protection, DC fail protection, etc. In protection statements, the booster works in by-pass statement and sends out alarm signal. Generally, manual maintenance is not required. Routine check every season or every half year is enough, including:

- Check whether the indicator lights of booster and power amplifier are normal, and whether the alarm light is on.
- Check whether the fans work normally.
- Check the signal around the BTS by using a mobile telephone.
- If any abnormity be found out, examine the system and make records.

3.1.2 Indicator lights

1.**The booster has 8 indicator lights for monitoring and alarm, as shown in the following figure:**

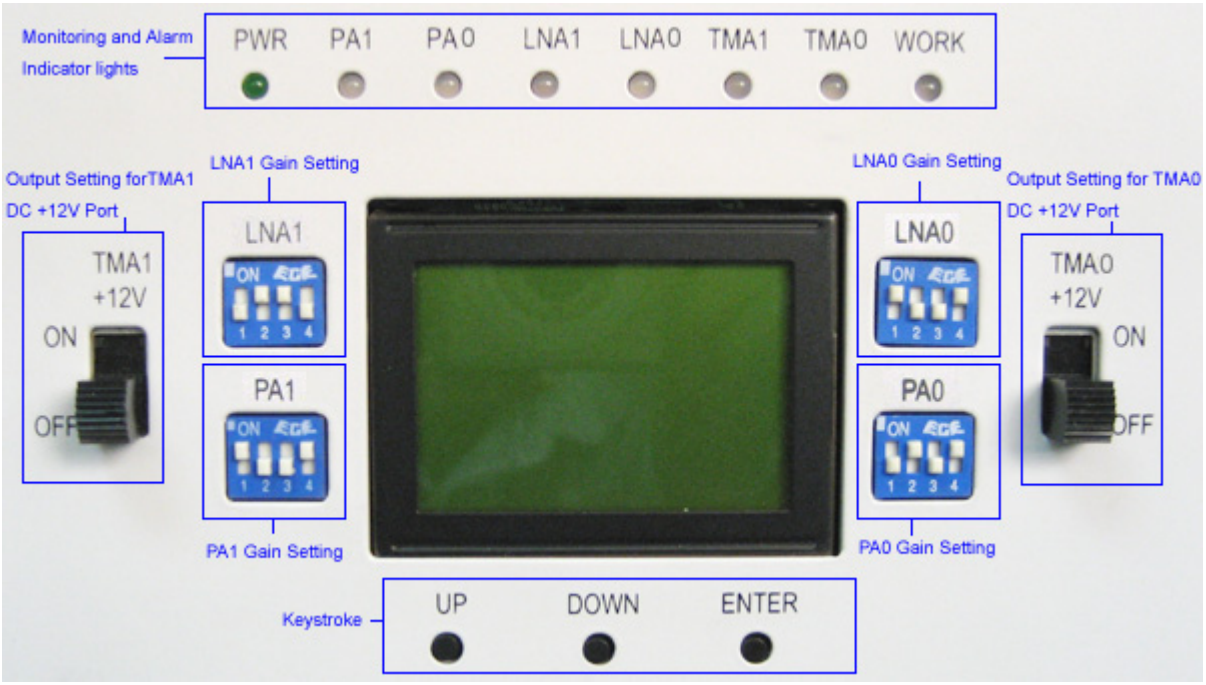


Figure 16 Indicator Lights & LCD

The specification of indicator lights is shown in Table 3

Table 9 Specification Of Indicator Light

Item	Label	Color	State	Specification
1	PWR -Power indicator light	Green	light	Power supply works normally
		-	dark	No power supply
2	PA1/PA0 -Power amplifier indicator light	Green	light	Power amplifier works normally
		Red	Light	Power amplifier failure
		-	dark	No power amplifier setting
3	LNA1/LNA0 -Low noise amplifier indicator light	Green	Light	Low noise amplifier works normally
		Red	Light	Low noise amplifier failure
		-	dark	No low noise amplifier setting
4	TMA1/TMA0 -Tower mounted amplifier indicator light	Green	light	Tower mounted amplifier works normally
		Red	light	Tower mounted amplifier failure
		-	dark	No Tower mounted power supply
5	WORK -System working indicator light	Green	spark	System working normally
		Red	spark	System working failure

2. **MCPA unit have 3 indicator lights, as the following figure:**

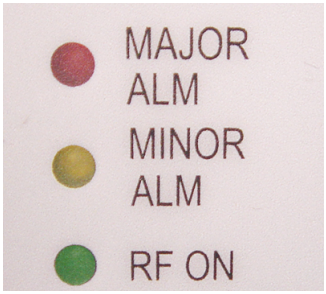


Figure 17 Indicator Lights For Power Amplifier

The alarm of MCPA unit includes: over-temp alarm, over-drive alarm, low gain alarm, VSWR alarm, over VSWR alarm, over voltage alarm. The indicator lights are shown in Table 2:

Table 10 Specification Of Power Amplifier Indicator Lights

Item	Label	Color	State	Specification
1	MAJOR ALM	Red	light	Power amplifier alarms and be shut down
	MINOR ALM	Yellow	Dark	
	RF ON	Green	Dark	
2	MAJOR ALM	Red	Dark	Power amplifier alarms and works
	MINOR ALM	Yellow	Light	
	RF ON	Green	Dark	
3	MAJOR ALM	Red	Dark	Power amplifier works normal
	MINOR ALM	Yellow	Dark	
	RF ON	Green	light	

3.2 Operation instruction

There are 3 operation buttons in the LCD:

- UP----Return to main menu
- DOWN----Roll option items
- ENTER----Confirm

3.2.1 Screen switch on

If no any operations for long time, LCD is turned off. When any buttons pressed, LCD is switched on to screen saver as following:

"HIGH POWER BOOSTER"

3.2.2 Screen saver off

When any button be pressed, LCD displays the following menu:

- PA STATUS
- MS STATUS
- CONTROL

The options' functions are listed below:

- PA STATUS ---- Status of power amplifier
- MS STATUS ----Status of system
- CONTROL---- Power amplifier replacement & control startup

Press DOWN to choose one item of PA STATUS/ MS STATUS/ CONTROL, press ENTER to get into the selected option

3.2.3 Status descriptions

1. **PA STATUS- power amplifier status**

Screen 1:

- PA ADDR :* (Power amplifier address)
  (Notes: Press 'Enter' key to select the power amplifier address)
- LINK: /OK/ERR (Communicate link OK/ERR)
- RF for: **.* dBm (Forward power)
- RF rev: **.* dBm (Reverse power)

Screen 2:

- PA ADDR :* (Power amplifier address)
- RFin: **.*dBm (Input power)
- VSWR:*.** (VSWR value)
- Temp: **.*'C (Temperature of power amplifier)

Screen 3:

- PA ADDR :* (Power amplifier address)
- Power: **.*V (Power supply for Power amplifier)
- STATUS: RUN/STOP (Power amplifier status: RUN/STOP)
- ALARM: NO/ OV_TMP/OV_POW/OV_DRV/DEVICE / VSWR /OV_VSWR/ OV_VOL (Alarm of power amplifier)

Specification for power amplifier alarm

Table 11 Specification For Power Amplifier Alarm

Alarm parameter	Specification
NO	No alarm
OV_TMP	Over temperature alarm
OV_POW	Over power alarm
OV_DRV	Over drive alarm
DEVICE	Low gain alarm
VSWR	VSWR alarm
OV_VSWR	Over VSWR alarm
OV_VOL	Over voltage alarm

2. **MS STATUS ---- System status**

Screen 1:

- STATUS OK/ALARM (System operation status)
- PA1 RUN/BYPASS (Power Amplifier 1 operation status)
- PA0 RUN//BYPASS (Power Amplifier 0 operation status)
- Temp: **.*'C (Environment temperature)

Screen 2:

- UP1 STA: /OK /ERR (Uplink 1 status)
- DO1 STA: /OK /ERR (Downlink 1 status)
- UP0 STA: /OK /ERR (Uplink 0 status)
- DO0 STA: /OK /ERR (Downlink 0 status)

Screen 3:

- LNA1: ***mA /NULL/OK /ERR (Low noise amplifier 1 working current and status)
- LNA0: ***mA /NULL /OK /ERR (Low noise amplifier 0 working current and status)
- TMA1: ***mA /NULL/OK /ERR (Tower Mounted Amplifier 1 working current and status)

- TMA0: ***mA /NULL/OK /ERR (Tower Mounted Amplifier 0 working current and status)

Screen 4:

- VSWR1: *.** (VSWR1 value)
- VSWR0: *.** (VSWR0 value)
- PWR1: /NULL /OK /ERR (Power unit 1 operation status)
- PWR2: /NULL /OK /ERR (Power unit 2 operation status)

Screen 5:

- LNA1 GAIN: ** (LNA1 gain value)
- LNA0 GAIN: ** (LNA0 gain value)
- PA1 GAIN: ** (Power amplifier 1 gain value)
- PA0 GAIN: ** (Power amplifier 0 gain value)

Screen 6:

- FAN1 STA: **/OK /ERR (Fan1 rotating at speed of: circle/minute)
- FAN2 STA: **/OK /ERR (Fan2 rotating at speed of: circle/minute)
- FAN3 STA: **/OK /ERR (Fan3 rotating at speed of: circle/minute)
- FAN4 STA: **/OK /ERR (Fan4 rotating at speed of: circle/minute)

Notice:

1. Status description: ‘OK’ - normal performance; ‘ERR’ - abnormal performance;
2. A ‘NULL’ will be displayed when LNA1/LNA0/TMA1/TMA0/PA1/PA0 are not be connected.
3. A ‘NULL’ will be displayed when PWR1/PWR2 have no output power.

---

3. **CONTROL--- Power amplifier reset and start control**

Screen 1:

PA ADDR :* (The address could be selected by press DOWN button)

1. RESET (Power amplifier reset)
2. Run (Power amplifier run)
3. RETURN (Return to main page)

3.2.4 Alarm range setting

Generally, the manufacturer has finished alarm range settings. User needn't to reset the range. Alarm range reference is shown in Table 12:

Table 12 Power Amplifier Alarm Limit

Item	Device	Alarm	Range
1	TMA1/TMA0	Over current	Upper limit:200mA Down limit:50mA Referential current:100mA
2	LNA1/LNA0	Over current	Upper limit:200mA Down limit:50mA Referential current:100mA
3	FAN	Fan rotate speed	Upper limit:5000 Down limit:500
4	PA1/PA0	Over power	Power amplifier shut down power value: 52.6dBm Over power restart: 51.6dBm.
5	PA1/PA0	Over temperature	Over temperature alarm and shut down power amplifier: ≥95□ Over temperature restart: 75□
6	PA1/PA0	Over VSWR	Over VSWR alarm and shut down: 5.0 Over VSWR restart :3.0

3.2.5 Parameter Setting

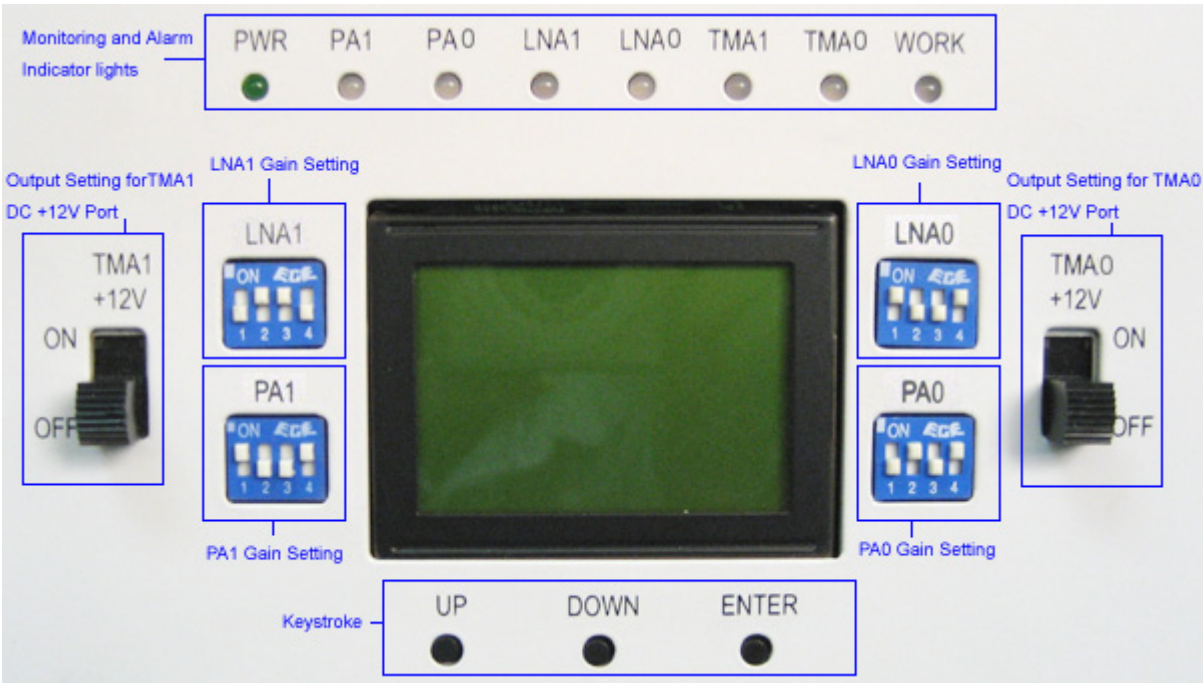


Figure 18 Parameter Setting

1. **Output power setting for TMA**

Table 13 Output Power Setting For TMA +12V

Item	Label	Switch	Specification
1	TMA1 +12V	ON	DC +12V port (TMA1) output DC +12V
		OFF	DC +12V port (TMA1) no power output
2	TMA0 +12V	ON	DC +12V port (TMA0) output DC +12V
		OFF	DC +12V port (TMA0) no power output

2. **Power amplifier and Low noise amplifier gain setting**

Shown as Figure18, LNA0/PA0/LNA1/PA1 are 4 bits 8421 code switches, '0' for switch up and '1' for down. The numbers are 8 - 4 - 2 – 1 in turn.

Table 14 Power Amplifier And Low Noise Amplifier Gain Setting

Item	Label	Description	Number	Range
1	LNA1	LNA1 gain setting	0~15	Adjust range:0~12dB
2	PA1	PA1 gain setting	0~15	Adjust range:0~15dB
3	LNA0	LNA0 gain setting	0~15	Adjust range:0~12dB
4	PA0	PA0 gain setting	0~15	Adjust range:0~15dB

For example, the setting numbers of Figure 18 are shown in table 15:

Table 15 A Example Of Power Amplifier And Low Noise Amplifier Gain Setting

Item	Label	Switch number	Description
1	LNA1	9	LNA1 Gain:9dB
2	PA1	6	PA1 Gain:6dB
3	LNA0	6	LNA0 Gain:6dB
4	PA0	10	PA0 Gain:10dB

Below descript the calculation of the gain of downlink PA and uplink LNA.

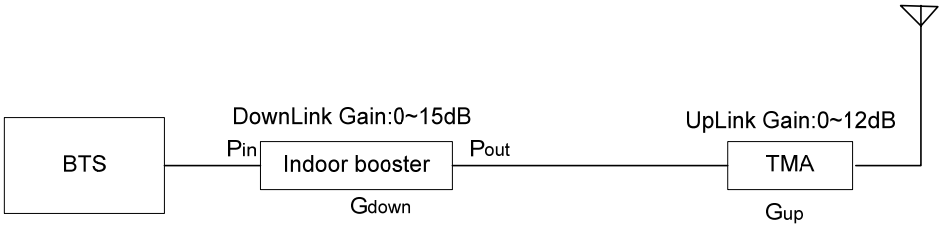


Table 16 Symbol Description

Item	Symbol	Description
1	P_{in}	BTS output power
2	G_{down}	PA gain
3	P_{out}	PA output power
4	G_{up}	LNA gain

The max output power of PA is 180W (52.5dBm), the gain of PA is calculated as the following formula:

$$G_{down}=P_{out}-P_{in}=52.5dBm-Pin$$

On the assumption that the output power of BTS is 20W (43dBm), than the gain is

$$G_{down}=P_{out}-P_{in}=52.5dBm-43dBm=9.5dB$$

To avoid the over-power alarm of the PA, set 1dB redundancy, and adjustable step is 1dB, so the PA gain is set 8dB.

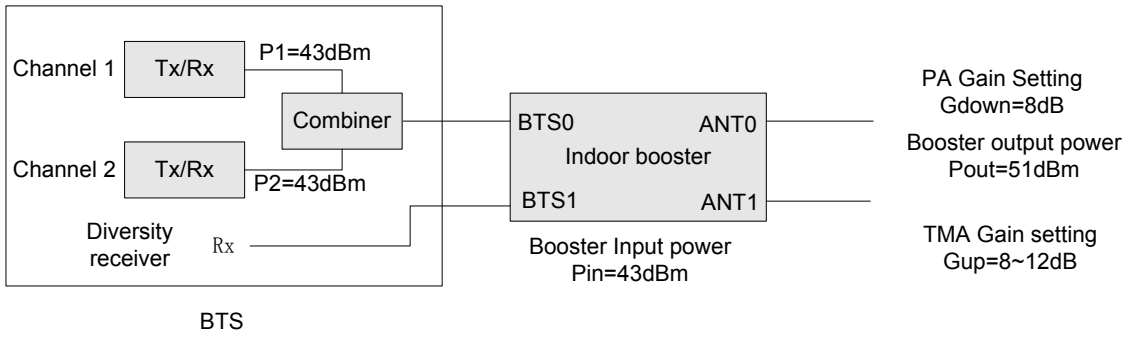
G_{up} compensates the insertion loss of feeder and booster. For engineering experience, G_{up} =8~12dB is recommended.

3. Adjustment of gain for BTS upgrade

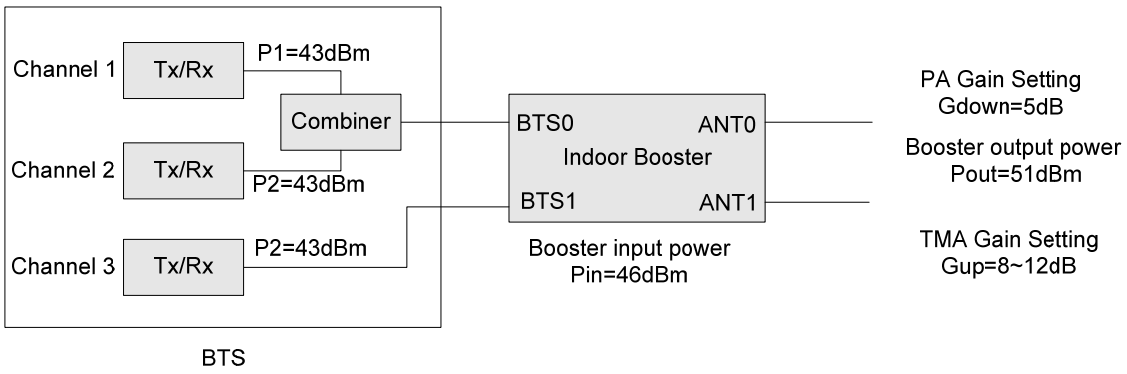
The BTS output power will be enhanced when the BTS adds channel and expand capability. That means the booster's input power will be improved. For the booster maximum output power is unchangeable, the PA gain needs to be reset to avoid the booster over-power alarm. The followings are some examples of the booster gain setting when the BTS adds channel. We suppose that the output power of each BTS channel is 43dBm.

1) BTS is upgraded from 2 channels to 3 or 4 channels.

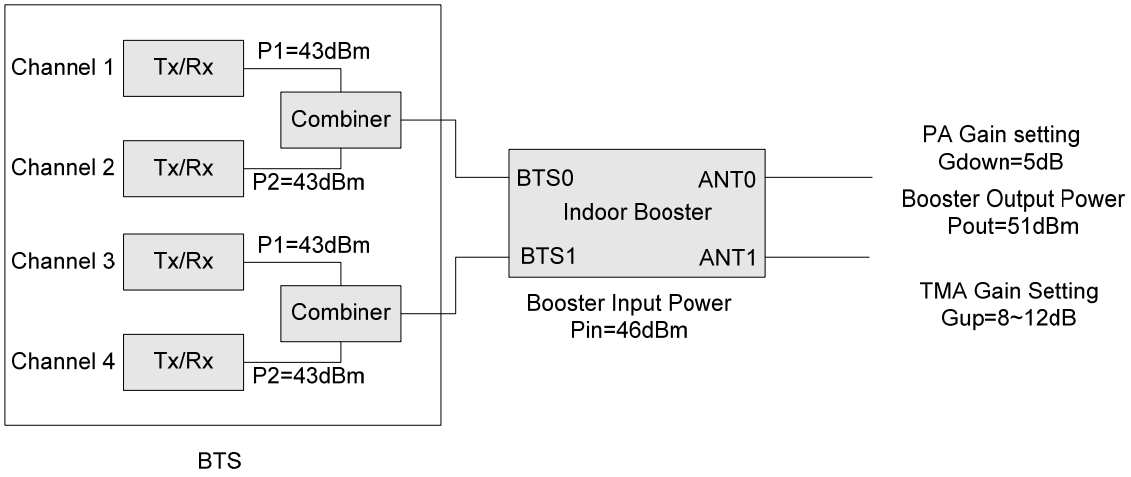
- 2 channels combination: PA gain setting Gdown=8dB



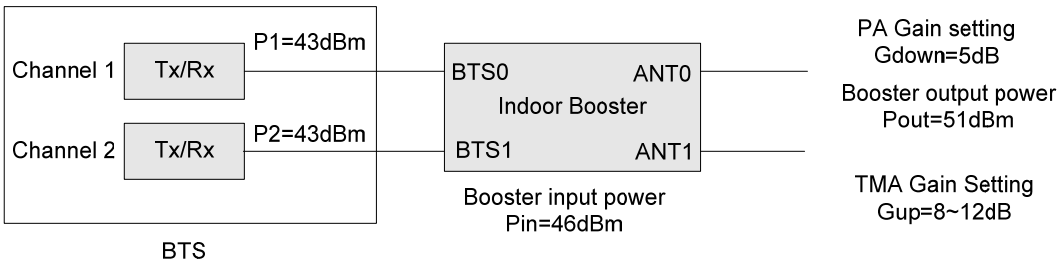
- 3 channels combination: PA gain setting Gdown=5dB



- 4 channels combination: PA gain setting Gdown=5dB

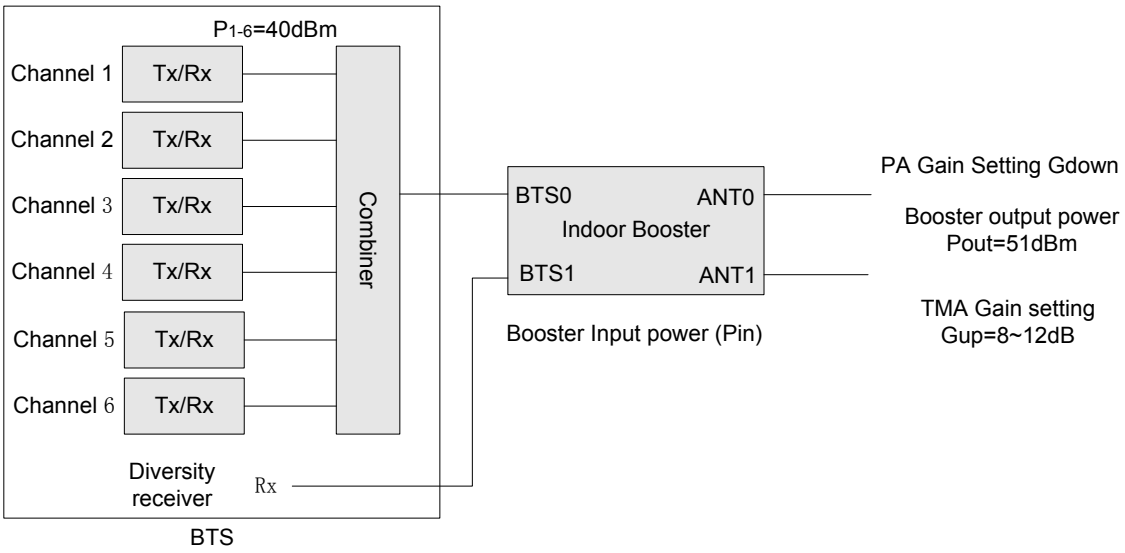


2) If 2 channels connect to booster as the following figure, the output power of BTS won't be changed when the BTS be upgraded to 3 or 4 channels. And the booster needn't reset the PA gain.



The 2 channels combined loss is 3dB usually, and there are some differences between different types of BTS. For example:

3) The 1~6 channels combination of Ericsson or Nokia BTS



Under the above combination method, the PA gain setting should be decreased 1.5dB with one channel increasing.

The above is a reference of booster gain setting when the BTS is upgraded. The general principle is to confirm the booster input power (Pin). Please contact the technical support of Bravo Tech, so as to make sure that the booster works normally after the BTS is upgraded.

3.2.6 Alarm and remote shutdown port specification

The alarm and remote shutdown port is shown in Figure 19, which is DB15 socket. The relevant pins will be short circuit when there is an alarm or shutdown, and the relevant pins will be open circuit when the system is normal. The specification of alarm and remote shutdown port is shown as Table17.

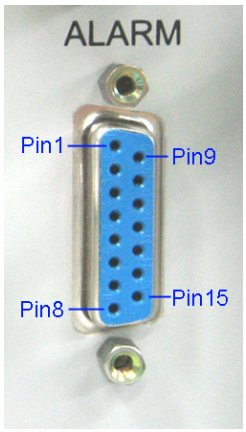


Figure 19 Alarm Port

Table 17 Specification Of Alarm Port

Item	Alarm indicator light label	Specification	Relevant Pins	Notes
1	---	Shut down by remote control	Pin1, Pin9	
2	WORK	System alarm	Pin2, Pin10	
3	TMA1/TMA0	TMA alarm	Pin3, Pin11	
4	PA1/PA0	Over power alarm	Pin4, Pin12	
5	PA1/PA0	Over temperature alarm	Pin5, Pin13	
6	VSWR	Over VSWR	Pin6, Pin14	
7	---	+12V output	Pin7	Back-up pin
8	---	GND	Pin15	Back-up pin

4 Technical Specification

BMB0900 Multi-Carrier booster technical specification

RX Characteristics (per sector)	Specification
Frequency Range	890 – 915MHz
Instantaneous Bandwidth	25MHz
Max Gain over frequency and temperature	12±1 dB
Adjustable Gain Range	0~12dB
Noise Figure	1.8dB(Typical)
Output 1dB Compression (max. Gain)	+12dBm
Output IP3 (max. Gain)	+23dBm
Return loss(VSWR)	14dB (1.5:1)

TX Characteristics (per sector)	Specification
Frequency Range	935 – 960MHz
Instantaneous Bandwidth	25MHz
Number of Carriers	8, 12, or 16 carriers
Output Power （Single MCPA）	Max average power:180W
	2 carriers: 80W / carrier
	4 carriers: 35W / carrier
Input Power	30~43dBm
Output Power Dynamic Range	10dB
Gain	0 - 15dB(+/-0.5dB)
	Adjustable in 1dB step
Spectrum Masks and Spurious Emissions	FCC compliant

System Characteristics (per sector)	Specification
Return loss(VSWR)	
BTS Ports	14dB (1.5:1)
Antenna Ports	14dB (1.5:1)
Forward Power Detection – TX	30dBm ~ 50dBm
Reverse Power Detection – TX	30dBm ~ 50dBm
Monitor & Control (LCD and Keypad)	Forward Power, Reverse Power, Temp, LNA Conditions (for both), PA Conditions, TX Gain Setting, RX Gain Setting, DC Voltage
Alarm & Protection (Form C type)	Overpower Shutdown, Over Temp Shutdown, Loop Fail Shutdown, Reverse Power Shutdown, DC Fail Shutdown

Environmental Characteristics	Specification
Indoor unit	
Operating Temperature Range	-20˚C ~ +55˚C
Cold Start Temperature	-40˚C
Storage Temperature	ETS 300 342-3
Humidity	150 000 hours

Outdoor unit	
Operating Temperature Range	-40°C ~ +65°C
Waterproof	IP67
Lightning Protection	8/20us, 10kA Pulse
EMC	ETS 300 342-3
MTBF	500,000 hours

Mechanical Characteristics	**Specification**
Indoor unit	
Material	Steel& Aluminum Frame
Weight	75Kg
Dimensions（H x W x D）	800mm x 330mm x 600mm
Connectors	
BTS Ports	7/16 DIN female
ANT Ports	7/16 DIN female
ALARM Port	DB15 female
Fan	4 Fans for single MCPA system
Outdoor unit	
Material	Aluminum housing
Weight	8.5Kg
Dimensions（H x W x D）	290mm x 200mm x 85mm
RF Connectors (BTS ANT)	7/16 DIN female

Options	**Specification**
Power Input	220VAC